

2.0 PURPOSE AND NEED FOR AGENCY ACTION

2.1 DOE's Purpose

As part of its stated agency mission, U.S. DOE's National Energy Technology Laboratory (NETL) provides science, technology, and policy options to resolve environmental, supply, and reliability issues associated with the use of fossil energy. Consistent with this mission and in partnership with its stakeholders, NETL supports efforts by industry to increase energy efficiency, minimize waste, reduce environmental impacts, and increase the availability of domestic energy production through productivity and operational enhancements and improvements. The Fuels and Energy Efficiency Projects Division of the NETL Office of Project Management implements external research, development and demonstration (RD&D) projects for natural gas processing, transportation fuels and chemicals, fuels advanced research, energy conservation and military applications. The Gas Supply Projects Division of the NETL Office of Project Management is responsible for implementing national programs for the recovery, development and efficient use of domestic fuel resources. Manage projects for the RD&D of advanced clean fuels systems including indirect liquefaction, direct liquefaction, premium carbon fuels and products, other advanced fuel systems, carbon sequestration/environmental technologies, and the RD&D of advanced natural gas based systems including upstream exploration and production and gas storage, and downstream natural gas upgrading, gas to liquids, and coal mine methane utilization.

Coal mine methane (methane that is released from coal seams during the mining process) is one source of natural gas that NETL is investigating as a potential resource for energy production. Methane is removed from coal seams either in advance of mining operations using conventional drilling techniques or by mine ventilation systems during active mining operations. Methane is vented from coal mines out of safety concerns for miners working the mine. Once a seam is mined out using longwall mining systems, the surrounding strata, or rock layers, collapse filling the void left from mining. This collapsed area, referred to as "gob", likewise can contain methane in recoverable quantities, and is sometimes referred to as "gob gas", a mixture of air and methane. In 1999, U.S. coal mines liberated a total of approximately 196 Bcf (billion cubic feet) of methane. The majority of this methane is simply released to the atmosphere. EPA estimates that 40 percent (88 Bcf) of methane emitted from underground mines could be profitably recovered and put to productive use (EPA, 2001). This amount of methane could supply heat to more than 1.2 million homes for an entire year.

One obstacle to the productive use of coal mine methane (CMM) is the low quality of the gas. Pipeline quality natural gas typically consists of 97% methane (EPA, 1997). Methane produced from coal bed seams ahead of mining operations is generally of high quality and can be injected directly into natural gas pipelines for sale. The methane content of gob gas, which has been mixed with mine ventilation air in varying

amounts, typically ranges from 65 to 85% methane. Gob gas is also typically saturated with water vapor. This further degrades the mine gas from pipeline specifications, which typically limit water vapor to no greater than 7 lbs per million standard cubic feet (lbs/MMscf). For CMM to be an acceptable energy resource, the gas must be upgraded to pipeline specifications. Because of the cost of upgrading CMM and the smaller quantities of gas typically produced by individual mine vents, CMM is often simply vented to the atmosphere near ground level. Released in this manner, CMM contributes to the ozone problems in the troposphere (the lowest layer of the earth's atmosphere) and at high concentrations can harm nearby vegetation and present a fire hazard (Brunner, 1999).

Methane also contributes to the "greenhouse effect". The greenhouse effect describes the buildup of heat on the earth's surface due, in part, to thermal radiation from the earth's atmosphere. Energy from the sun entering the earth's atmosphere heats the earth's surface and in turn is radiated back into space. Some of this outgoing energy is absorbed by atmospheric gases. The atmosphere, in turn, radiates energy in all directions - including back toward the earth's surface. Because the earth's surface is warmer than it would be without the heat contributed by atmospheric radiation, the effect is referred to as the "greenhouse effect" referring to how the glass panels in a garden greenhouse retain heat from the sun.

The greenhouse effect is necessary for the earth's surface to support life, but excess amounts of greenhouse gases (gases in the atmosphere that affect the earth's temperature and contribute to the greenhouse effect) are believed to contribute to global climate change. Some greenhouse gases (GHG) result exclusively from human activities; others occur naturally or in combination with human activities. Naturally occurring GHG include water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Human activities add to the levels of these naturally occurring greenhouse gases.

Individual greenhouse gases contribute to global warming in differing degrees. Methane is 21 times more effective in trapping heat than is carbon dioxide (EPA, 2001). In assessing the contribution to global warming, estimates of GHG emissions are presented in terms of their equivalent effect relative to an equal amount of carbon dioxide. The unit used to express this equivalency is million metric tons (1000 kilograms) of carbon equivalents (MMTCE). One million metric tons is equal to one trillion grams, and the unit is sometimes expressed as teragrams (trillion grams) of CO₂ Equivalents (Tg CO₂ Eq.). Total annual methane emissions from sources within the U.S. in 1999 were approximately 620 MMTCE (EPA, 2001a). Overall, methane's contribution to global warming is second only to carbon dioxide. Coal mining is the fourth largest source of atmospheric methane in the U.S. In 1999, mining activities contributed nearly 62 (MMTCE) to methane emissions.

NETL is currently conducting activities under four specific climate change objective areas, including:

- Developing protocols and methodologies for the cost-effective implementation of flexible, market-based mechanisms for greenhouse gas emission control.
- Promoting the international transfer of clean technologies.
- Researching and encouraging the domestic adoption of greenhouse gas reducing technologies, and
- Training, developing analytical tools, and building capacity to develop regional and global capabilities to mitigate the effects of climate change.

The proposed project would be consistent with the DOE mission to ensure energy availability and to develop domestic renewable energy resources. It would utilize a source of energy (methane) that is a waste byproduct of coal mining and a potent greenhouse gas. The proposed project would be consistent with DOE's ongoing research in developing and implementing GHG-reducing technologies. This project would also be consistent with DOE's commitment to environmental quality by demonstrating technologies that utilize waste methane, a major contributor to global warming.

2.2 DOE's Need for Action

NETL identified this opportunity after evaluating responses to solicitation number DE-PS26-00NT40767, entitled Recovery and Utilization of Coal Mine Methane: Pilot-Scale Demonstration Phase, released in March 10, 2000. The objective of this effort is to reduce methane emissions associated with underground coal mining operations by demonstrating state-of-the-art coal mine gas recovery and utilization technologies. The resulting demonstrations would provide coal and energy companies with cost-effective commercial technology systems for effective recovery and utilization of coal mine methane emissions.

The project would demonstrate that coal mine waste methane emissions could be utilized as a fuel for electric power production. It would also demonstrate that waste methane could be economically processed into pipeline quality methane capable of being added to an existing distribution system for eventual sale and utilization. The coal mine waste methane would otherwise be vented to the atmosphere contributing to global warming, so the proposed project would also demonstrate the feasibility of reducing methane emissions from mining operations in a manner that is economically attractive to U.S. mining operations.

With proper management and oversight, there is a high probability of success with this project. The proposed approach would utilize lower quality methane to produce electric power and add the electricity produced into a local grid for use by a local mining operation. Higher quality waste methane processed into pipeline quality methane would be added to a nearby pipeline for distribution and use. The technologies have been shown in previous projects to be effective. The integrated gas processing/power generation project would capture data on how efficiently waste

methane can be processed and utilized for both electric generation and pipeline quality gas. Such information could lead to implementation of this or similar technology at other sites where suitable waste methane sources exist.

DOE's decision considered in the EA is whether to provide funding for the construction of this project. Northwest Fuel would be the responsible party for the operation and maintenance of the project if the decision is made to approve the proposed action.

2.3 Scoping

Internal scoping activities were conducted to identify significant issues associated with the proposed project. This effort was based on a review of the proposed technology, construction and operational requirements for the project, long-term plans, the environmental setting, and other information available on the project. Scoping activities have included: internal discussions of the project and its potential environmental implications; discussions with the industrial participant; DOE review of preliminary environmental information supplied by the industrial participant; on-site visits at the proposed location; and preliminary characterization of background conditions.

Northwest Fuel has experience operating similar projects at other locations. As part of the scoping process, DOE visited two sites near Cadiz, OH on October 25th, 2001 to verify the proposed project configurations and identify potential impacts of the proposed action.

2.4 Scope of the Environmental Assessment

Extensive materials were provided by Northwest Fuel from similar projects and for the proposed Integrated Power Generation System project. These materials were reviewed by DOE, and an internal scoping meeting was held in May 2001 to discuss potential environmental concerns to be considered in the EA. An initial visit to the project site was made in July 2001; DOE has visited the site a number of times subsequent to the initial visit. Based on these reviews, DOE prepared a list of resources of concern and an approach for their analysis in the EA.

No adverse pollution prevention or environmental justice issues were identified in the internal scoping process. The proposed project would utilize a waste product (CMM) and put it to beneficial use, thereby presenting an opportunity for pollution prevention. The technology considered does not involve the use of hazardous materials other than oil and ethylene glycol, and would not generate wastewater. It thereby represents a favorable pollution prevention strategy. Environmental Justice, as described in Executive Order 12898, calls for the fair treatment and involvement of all people regardless of race,

ethnicity, culture, income, or education level with respect to environmental laws, regulations, and policies. The expected emissions from air pollutants would not move offsite to any cluster of minority populations. No disproportionately high or adverse impacts on low-income minority populations would result from the proposed action.

Though no impacts on flora and fauna and historical and cultural resources are expected, to comply with the NEPA regulations, coordination letters were forwarded to the U.S. Fish and Wildlife Service and State Historic Preservation Officer. These letters, and the responses from the agencies contacted, are included in Appendix A of this EA.

Based on the scoping process, the key issues identified and analyzed for the proposed action included the following:

- Air emissions
- Noise generation
- Land surface disturbance
- Stream disturbance
- Release of waste gas

For those resources requiring detailed analysis, a framework was developed to provide qualitative indicators of the impact assessment or threshold analysis. Qualitative analyses were applied for all resources except air quality and noise pollution.

Air quality impacts were identified as one potential issue during scoping. Air emissions and air quality impacts were analyzed using quantitative information available from an air permit submitted to the West Virginia Department of Environmental Protection (WVDEP). Northwest Fuel applied for a permit to construct a new stationary source in July of 1997. A state permit to construct a new stationary source of air pollutants was issued by the WVDEP Division of Air Quality (DAQ) to Northwest Fuel Development, Inc. on December 29, 1999.

Noise generation is another potential issue identified during scoping of the EA. Previously, a mine shaft ventilation fan was placed at the proposed project site, causing a significant increase in noise levels and raising the concern of neighboring homeowners. The fan has since been removed, but residents living near the site have become sensitized to the issue of noise pollution. Analysis of background noise values indicates that this area is a quiet rural community. People in the immediate area of the proposed project would be sensitive to any significant increase in noise levels resulting from this proposed project. Background information was collected from the proposed site and at a similar site in Ohio to evaluate potential noise impacts.

Disturbance of land and aquatic environments at the project site is another potential issue. Since the proposed project would not result in any pollutant discharges to the adjacent watershed, any disturbance of aquatic environments would be limited to construction activities only. The affected environment for the analysis of impacts was

considered to be the boundaries of the WV portion of Dunkard Creek watershed and Monongalia County. The proposed project was also evaluated with respect to floodplain restrictions and potential impacts on any identified wetlands.

Construction of the proposed project may also have some impacts on the immediate area. However, since this area has previously been altered for other mine-related projects, these impacts would be limited. Environmental consequences of land disturbance from the proposed action were evaluated for the project site area only.

Under the No Action Alternative, DOE would not participate in the proposed project nor provide funding for to assist in the construction of the Integrated Power Generation System. For this proposed project, the industrial partner (Northwest Fuel Development, Inc.) could decide to proceed with the project even if DOE decides not to participate. Potential project impacts discussed in this EA would then be realized no matter what the DOE decides. Should the industrial participant decide not to proceed without DOE's contribution, current venting of waste methane from the mine would continue. The No Action Alternative is analyzed accordingly recognizing these two possible outcomes. DOE'S involvement would insure that project data are objectively analyzed to evaluate the benefits this system may offer. Also, by keeping DOE involved, the neighbors would retain an advocate committed to analyzing potential environmental impacts and evaluating and/or implementing alternative engineering solutions for issues identified.